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## The Commissioner of Patents and Trademarks

*Has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.*

*Therefore, this*

### United States Patent

*Grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America for the term set forth below, subject to the payment of maintenance fees as provided by law.*

*If this application was filed prior to June 8, 1995, the term of this patent is the longer of seventeen years from the date of grant of this patent or twenty years from the earliest effective U.S. filing date of the application, subject to any statutory extension.*

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*J. Todd Pichini*

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11033 U.S. PTO  
09/851874  
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US005943448A

**United States Patent** [19]

Tatsuta

[11] Patent Number: **5,943,448**[45] Date of Patent: **Aug. 24, 1999**

[54] **INFORMATION REPRODUCING SYSTEM,  
INFORMATION RECORDING MEDIUM,  
AND INFORMATION RECORDING  
APPARATUS**

[75] Inventor: **Seiji Tatsuta**, Hachioji, Japan

[73] Assignee: **Olympus Optical Co., Ltd.**, Tokyo,  
Japan

[21] Appl. No.: **08/764,136**

[22] Filed: **Dec. 12, 1996**

[30] **Foreign Application Priority Data**

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[51] Int. Cl.<sup>6</sup> ..... **G06K 9/38; G06T 7/60**

[52] U.S. Cl. .... **382/270; 382/286**

[58] Field of Search ..... 382/270, 286,  
382/312, 321, 317, 287; 358/465, 466

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*Primary Examiner*—Scott Rogers

*Attorney, Agent, or Firm*—Frishauf, Holtz, Goodman,  
Langer & Chick, P.C.

[57] **ABSTRACT**

A binarizing section generates binarized data from an image signal of a dot code on an information recording medium read by a code reading section. The binarizing section has a reference dot detection section, a dot area measuring section, a threshold value modifying section and a threshold value determining section. The reference dot detection section binarizes the image signal with a predetermined threshold value prior to generating binarized data to detect a reference dot from a binarized code image. The dot area measuring section measures the area of the reference dot detected by the reference dot detection section. The threshold value modifying section modifies the threshold value for binarization in such a manner that the area measured by the dot area measuring section approaches a predetermined target value. The threshold value determining section binarizes the image signal with the threshold value modified by the threshold value modifying section.

**24 Claims, 50 Drawing Sheets**

